

CLAIMS

What is claimed is:

- 1 1. A digital multimedia contact center comprising:
 - 2 a workflow engine operable for executing a workflow for a contact that specifies
 - 3 processing of the contact;
 - 4 a set of media routers coupled to the workflow engine, each media router
 - 5 operable for sending a contact associated with a particular media type to the workflow
 - 6 engine and operable for routing the contact to an agent if an agent is allocated to the
 - 7 contact;
 - 8 a dynamic automatic contact distributor coupled to the workflow engine and
 - 9 operable for allocating an agent to the contact when requested by the workflow and for
 - 10 returning an identifier for the allocated agent to the workflow engine;
 - 11 an agent desktop coupled to the workflow engine and operable for receiving a
 - 12 contact routed by a media router and presenting the contact to the allocated agent for
 - 13 processing; and
 - 14 a database coupled to the workflow engine for recording the processing of the
 - 15 contact by the allocated agent.
- 1 2. The digital multimedia contact center of claim 1, wherein the particular media
- 2 types are selected from the group consisting of analog voice, digital voice, video, email,
- 3 fax, and Web.
- 1 3. The digital multimedia contact center of claim 1, wherein the workflow engine is
- 2 further operable for executing a workflow for an agent that controls the contacts allocated
- 3 to the agent.

1 4. The digital multimedia contact center of claim 1, wherein the workflow engine
2 comprises:

3 a set of contact workflow subsystems, each contact workflow subsystem operable
4 for starting a workflow for a contact associated with a particular media type and coupled
5 to the media router associated with the particular media type;

6 an agent workflow subsystem coupled to the agent desktop and operable for
7 starting a workflow for an agent logged into the agent desktop; and

8 workflow logic for executing the workflows and coupled to the workflow
9 subsystems through a message passing layer.

1 5. The digital multimedia contact center of claim 1, wherein the workflow engine is
2 further operable for creating a directed graph that represents a workflow.

1 6. The digital multimedia contact center of claim 5, wherein the workflow engine
2 creates the directed graph from a template file defining prototype nodes representing
3 steps and a configuration file for the workflow that defines a structure for the graph.

1 7. The digital multimedia contact center of claim 1, wherein each of the media
2 routers is coupled to an external system, each external system operable for receiving,
3 from a communications channel, contacts having the particular media associated with the
4 coupled media router, each external system being associated with a particular media type
5 and further operable for routing a contact to the agent desktop when instructed by the
6 coupled media router.

1 8. The digital multimedia contact center of claim 7, wherein one of the media
2 routers is an email escalator coupled to an email server, the email escalator operable for
3 escalating a email contact from a deferred service tier to an immediate service tier based
4 on pre-determined email escalation criteria.

1 9. The digital multimedia contact center of claim 7, wherein one of the media
2 routers is a collaboration router coupled to a web server, the collaboration router operable
3 for escalating a web contact from a self-service service tier to an immediate service tier
4 in response to user input.

1 10. The digital multimedia contact center of claim 7, wherein one of the media
2 routers is a voice router coupled to a voice server, the voice router operable for de-
3 escalating a voice contact from an immediate service tier to a self-service service in
4 response to contact information and further operable for escalating a voice contact from
5 the self-service tier to the immediate service tier in response to user input.

1 11. The digital multimedia contact center of claim 7 further comprising a database
2 unification layer coupled between the database and the workflow engine and further
3 coupled to the external systems to integrate information maintained by the external
4 systems and the database.

1 12. The digital multimedia contact center of claim 11, wherein the workflow engine
2 further comprises a database subsystem to interpret database accesses made by a
3 workflow into accesses for the database unification layer.

1 13. The digital multimedia contact center of claim 1, wherein the dynamic automatic
2 contact distributor maintains an unordered list of waiting contacts and an unordered list
3 of available agents to allocate a contact to an agent.

1 14. The digital multimedia contact center of claim 13, wherein the dynamic automatic
2 contact distributor allocates a new contact to an agent by evaluating the unordered list of
3 available agents using a first expression of weighted attributes.

1 15. The digital multimedia contact center of claim 14, wherein the dynamic automatic
2 contact distributor places the new contact in the unordered list of waiting contacts if no
3 agent in the unordered list of available agents satisfies the first expression.

1 16. The digital multimedia contact center of claim 14, wherein the dynamic automatic
2 contact distributor allocates a newly available agent to a contact by evaluating the
3 unordered list of waiting contacts using a second expression of weighted attributes.

1 17. The digital multimedia contact center of claim 16, wherein the dynamic automatic
2 contact distributor places the newly available agent in the unordered list of available
3 agents if no contact in the unordered list of waiting contacts satisfies the second
4 expression.

1 18. A computer-readable medium having computer-executable modules comprising:
2 a workflow engine to execute a workflow for a contact that specifies processing
3 of the contact;

4 a plurality of media routers for coupling to the workflow engine to send a contact
5 associated with a particular media type to the workflow engine and to route the contact to
6 an agent if an agent is allocated to the contact; and

7 a dynamic automatic contact distributor for coupling to the workflow engine to
8 allocate an agent to the contact when requested by the workflow and return an identifier
9 for the allocated agent to the workflow engine.

1 19. The computer-readable medium of claim 18 having further computer-executable
2 modules comprising:
3 a database for coupling to the workflow engine to record the processing of the
4 contact by the allocated agent.

1 20. The computer-readable medium of claim 19 having further computer-executable
2 modules comprising:

3 a database unification layer that integrates information maintained by the database
4 and a plurality of external systems for particular media types.

1 21. The computer-readable medium of claim 20 having further computer-executable
2 modules comprising:

3 a database subsystem to interpret database accesses made by a workflow into
4 accesses for the database unification layer.

1 22. The computer-readable medium of claim 18 having further computer-executable
2 modules for the workflow engine comprising:

3 a plurality of contact workflow subsystems to a workflow for a contact associated
4 with a particular media type and for coupling to the media router associated with the
5 particular media type;

6 an agent workflow subsystem for coupling to an agent desktop and to start a
7 workflow for an agent logged into the agent desktop; and

8 workflow logic to execute the workflows and for coupling to the workflow
9 subsystems through a message passing layer.

1 23. The computer-readable medium of claim 18, wherein each of the media routers is
2 further operable for coupling to an external system that receives, from a communications
3 channel, contacts having the particular media associated with the coupled media router,
4 each external system being associated with a particular media type to route a contact to
5 an agent desktop when instructed by the coupled media router.

1 24. The computer-readable medium of claim 18, wherein one of the media routers is
2 an email escalator for coupling to an email server to escalate an email contact from a

3 deferred service tier to an immediate service tier based on pre-determined email
4 escalation criteria.

1 25. The computer-readable medium of claim 18, wherein one of the media routers is
2 a collaboration router for coupling to a web server to escalate a web contact from a self-
3 service service tier to an immediate service tier in response to user input.

1 26. The computer-readable medium of claim 18, wherein one of the media routers is
2 a voice router for coupling to a voice server to de-escalate a voice contact from an
3 immediate service tier to a self-service service in response to contact information and to
4 escalate a voice contact from the self-service tier to the immediate service tier in
5 response to user input.

1 27. The computer-readable medium of claim 18, wherein the dynamic automatic
2 contact distributor maintains an unordered list of waiting contacts and an unordered list
3 of available agents to allocate a contact to an agent.

1 28. The computer-readable medium of claim 27, wherein the dynamic automatic
2 contact distributor allocates a new contact to an agent by evaluating the unordered list of
3 available agents using a first expression of weighted attributes.

1 29. The computer-readable medium of claim 28, wherein the dynamic automatic
2 contact distributor places the new contact in the unordered list of waiting contacts if no
3 agent in the unordered list of available agents satisfies the first expression.

1 30. The computer-readable medium of claim 28, wherein the dynamic automatic
2 contact distributor allocates a newly available agent to a contact by evaluating the
3 unordered list of waiting contacts using a second expression of weighted attributes.

1 31. The computer-readable medium of claim 30, wherein the dynamic automatic
2 contact distributor places the newly available agent in the unordered list of available
3 agents if no contact in the unordered list of waiting contacts satisfies the second
4 expression.

1 32. A computer-readable medium having computer-executable modules comprising:
2 an agent desktop for coupling to a workflow engine to receive a contact routed by
3 a media router and to present the contact to an agent logged into the agent desktop for
4 processing.

1 33. A computerized method for determining a service tier for a contact in a digital
2 multimedia contact center comprising:
3 determining an initial service tier for the contact based on routing criteria for the
4 contact;
5 de-escalating the contact to a lower service tier if a change in the routing criteria
6 does not satisfy pre-defined criteria for the initial service tier; and
7 escalating the contact to a higher service tier if a change in the routing criteria
8 satisfies pre-defined criteria for the higher service tier.

1 34. The computerized method of claim 33 further comprising initially determining
2 the routing criteria based on a media type associated with the contact.

1 35. The computerized method of claim 33 further comprising changing the routing
2 criteria through a workflow for the contact.

1 36. The computerized method of claim 33 further comprising changing the routing
2 criteria based on contact activity.

1 37. A computer-readable medium having computer-executable instructions
2 comprising:
3 determining an initial service tier for a contact in a digital multimedia contact
4 center based on routing criteria for the contact;
5 de-escalating the contact to a lower service tier if a change in the routing criteria
6 does not satisfy pre-defined criteria for the initial service tier; and
7 escalating the contact to a higher service tier if a change in the routing criteria
8 satisfies pre-defined criteria for the higher service tier.

1 38. The computer-readable medium of claim 37 having further computer-executable
2 instructions comprising:
3 initially determining the routing criteria based on a media type associated with the
4 contact.

1 39. The computer-readable medium of claim 37 having further computer-executable
2 instructions comprising changing the routing criteria through a workflow for the contact.

1 40. The computer-readable medium of claim 37 having further computer-executable
2 instructions comprising changing the routing criteria based on contact activity.

1 41. A computer system comprising:
2 a processing unit;
3 a memory coupled to the processing unit through a bus; and
4 a service tiering process executed from the memory to cause the processing unit
5 to determine an initial service tier for a contact in a digital multimedia contact center
6 based on routing criteria for the contact, to de-escalate the contact to a lower service tier
7 if a change in the routing criteria does not satisfy pre-defined criteria for the initial

8 service tier, and to escalate the contract to a higher service tier if a change in the routing
9 criteria satisfies pre-defined criteria for the higher service tier.

1 42. The computer system of claim 41, wherein the service tiering process further
2 causes the processing unit to initially determine the routing criteria based on a media type
3 associated with the contact.

1 43. The computer system of claim 41, wherein the service tiering process further
2 causes the processing unit to change the routing criteria through execution of a workflow
3 for the contact.

1 44. The computer system of claim 41, wherein the service tiering process further
2 causes the processing unit to change the routing criteria based on contact activity.

1 45. A computer-readable medium having a data structure for a contact detail record
2 comprising:

3 a contact ID field containing data representing a contact identifier for a contact
4 associated with the contact detail record;

5 a media type field containing data representing a media type for the contact
6 identified by the contact ID field;

7 a contact class ID containing data representing a classification for the contact
8 identified by the contact ID field;

9 an assigned agent ID containing data representing an agent assigned to handle the
10 contact identified by the contact ID field; and

11 a plurality of contact state fields, each contact state field comprising:

12 a contact state field containing data representing a state of the contact
13 identified by the contact ID field at a particular time; and

14 a timestamp field containing data representing the particular time
15 associated with data in the contact state field.

1 46. The computer readable medium of claim 45, wherein the data structure further
2 comprises:

3 a case ID field containing data representing a contact resource management case
4 identifier for the contact identified by the contact ID field.

1 47. A computer readable having a data structure for an agent record comprising:

2 an agent ID field containing data representing an agent identifier for an agent

3 associated with the agent record;

4 an agent class ID field containing data representing a classification for the agent

5 identified by the agent ID field;

6 an assigned contact ID field containing data representing an identifier for a

7 contact assigned to the agent identified by the agent ID field; and

8 a plurality of agent state fields, each agent state field comprising:

9 an agent state field containing data representing a state of the agent

10 identified by the agent ID field at a particular time; and

11 a timestamp field containing data representing the particular time

12 associated with data in the agent state field.

1 48. A method of communicating between a media router and a contact workflow
2 subsystem in a digital multimedia contact center comprising:
3 issuing, by the media router to the contact workflow subsystem, a startworkflow
4 call including an identifier for the media router and attributes of a contact; and
5 returning, by the contact workflow subsystem to the media router, an identifier for
6 a workflow for the contact in response to receiving the startworkflow call.

1 49. The method of claim 48 further comprising:
2 issuing, by the media router to the contact workflow subsystem, an injectevent
3 call including the identifier for the workflow and an event to be injected into the
4 workflow.

1 50. The method of claim 48 further comprising:
2 issuing, by the media router to the contact workflow subsystem, a handlescontact
3 call including an identifier for a contact workflow; and
4 returning, by the contact workflow subsystem to the media router, a response
5 indicating if the contact workflow subsystem is handling the contact workflow.

1 51. The method of claim 48 further comprising:
2 issuing, by the contact workflow subsystem to the media router, an
3 assigncontacttoagent call including an identifier for a workflow for a contact and an
4 identifier for a workflow for an agent; and
5 returning, by the media router to the contact workflow subsystem, a response
6 indicating if the contact was routed to the agent.

1 52. The method of claim 48 further comprising:
2 issuing, by the contact workflow subsystem to the media router, a
3 terminatecontact call including an identifier for a contact workflow.

1 53. A method of communicating between a media router and an agent workflow
2 subsystem in a digital multimedia contact center comprising:
3 issuing, by the media router to the agent workflow subsystem, a startworkflow
4 call including attributes of an agent; and
5 returning, by the agent workflow subsystem to the media router, an identifier for a
6 workflow for the agent in response to receiving the startworkflow call.

1 54. The method of claim 53 further comprising:
2 issuing, by the media router to the agent workflow subsystem, an injectevent call
3 including the identifier for the workflow and an event to be injected into the workflow.

1 55. The method of claim 53 further comprising:
2 issuing, by the media router to the agent workflow subsystem, a handlesagent call
3 including an identifier for an agent workflow; and
4 returning, by the agent workflow subsystem to the media router, a response
5 indicating if the agent workflow subsystem is handling the agent workflow.

1 56. A method of operating a multimedia contact center comprising:
2 receiving, by a media router, a contact of a media type particular to the media
3 router;
4 sending, by the media router, the contact to a workflow subsystem particular to
5 the media type of the contact;
6 initiating, by the workflow subsystem, a workflow for the contact;
7 sending, by the workflow for the contact, a request for an agent to handle the
8 contact to the workflow subsystem;
9 requesting, by the workflow subsystem, an agent from an automatic contact
10 distributor;
11 allocating, by the automatic contact distributor, an agent to the contact;
12 sending, by the automatic contact distributor, an identifier for the agent allocated
13 to the contact to the workflow subsystem;
14 receiving, by the workflow subsystem, the identifier for the agent;
15 sending, by the workflow subsystem, the identifier for the agent to the media
16 router; and
17 routing, by the media router, the contact to the agent allocated to the contact.

1 57. The method of claim 56 further comprising:
2 receiving, by an agent desktop, a login by an agent;
3 sending, by the agent desktop, agent information to an agent subsystem;
4 receiving, by the agent subsystem, the agent information;
5 initiating, by the agent desktop, a workflow for the agent;
6 sending, by the workflow for the agent, a request for a contact to the agent
7 subsystem;
8 requesting, by the agent subsystem, a contact from the automatic contact
9 distributor;
10 allocating, by the automatic contact distributor, the agent to a contact;
11 sending, by the automatic contact distributor, an identifier for the contact
12 allocated to the agent to the agent subsystem;
13 receiving, by the agent subsystem, the identifier for the contact;
14 sending, by the agent subsystem, an indication to the workflow that the agent has
15 been allocated to a contact;
16 receiving, by the agent desktop, a contact from a media router; and
17 sending, by the agent desktop, the contact to an appropriate subsystem for
18 processing.

1 58. A computerized server for a digital multimedia contact center comprising:
2 a processing unit;
3 a memory coupled to the processing unit through a bus;
4 a network interface coupled to the processing unit through the bus and further
5 operable for coupling to a network;
6 a media router executed from the memory to cause the processing unit to receive
7 a contact of a media type particular to the media router from the network interface, to
8 send the contact to a workflow subsystem particular to the media type of the contact, and

9 to route the contact to an agent identified by the workflow subsystem through the
10 network interface.

11 the workflow subsystem executed from the memory to cause the processing unit
12 to initiate a contact workflow for the contact received from the media router, to request
13 an agent from an automatic contact distributor, to receive an identifier for an agent from
14 the automatic contact distributor, and to send the identifier for the agent to the media
15 router;

16 the contact workflow executed from the memory to cause the processing unit to
17 send a request for an agent to handle the contact to the workflow subsystem; and

18 the automatic contact distributor to cause the processing unit to allocate an agent
19 to the contact and to send the identifier for the agent allocated to the contact to the
20 workflow subsystem.

1 59. The computerized server of claim 58, wherein the automatic contact distributor is
2 further operable to cause the processing unit to receive a request for a contact from an
3 agent subsystem and to send an identifier for the contact allocated to the agent to the
4 agent subsystem, and further comprising:

5 the agent subsystem executed from the memory to cause the processing unit to
6 receive agent information from the network interface, to initiate an agent workflow for
7 the agent, to request a contact from the automatic contact distributor, to receive the
8 identifier for the contact from the automatic contact distributor and to send an indication
9 to the agent workflow that the agent has been allocated to a contact; and

10 the agent workflow executed from the memory to cause the processing unit to
11 send a request for a contact to the agent subsystem.

1 60. A computerized client for a multimedia contact center comprising:
1 a processing unit;
2 a memory coupled to the processing unit through a bus;

3 a network interface coupled to the processing unit through the bus and further
4 operable for coupling to a network; and
5 an agent desktop executed from the memory to cause the processor to receive a
6 login by an agent, to send agent information to an agent subsystem through the network
7 interface, to receive a contact from the network interface, and to send the contact to an
8 appropriate subsystem for processing.